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10/785,219	02/24/2004	Laimutis Jacinavicius	01915.0002-US-01	8799

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EXAMINER

UNELUS, ERNEST

ART UNIT

PAPER NUMBER

2828

DATE MAILED: 12/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

11A

<b>Office Action Summary</b>	<b>Application No.</b> 10/785,219	<b>Applicant(s)</b> JACINAVICIUS ET AL.	
	<b>Examiner</b> Ernest Unelus	<b>Art Unit</b> 2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 January 2004.
- 2a) ☐ This action is FINAL.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 02/24/04, 06/01/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Richardson et al. (US pat. 6,917,631).

With respect to claim 1, Richardson discloses a pulsed laser comprising: a first beam path for establishing at least one short light pulse (22 to 20 in fig. 2); a second beam path for amplifying the short light pulse to obtain at least one high power short light pulse (21 to 54 in fig. 2); a switch for directing the short light pulse from the first beam path into the second beam path (col. 9, line 11-15); and a pulse shortening element (12) disposed in the first beam path and absent from the second beam path (see fig. 2).

With respect to claim 17, Richardson discloses a resonator cavity having a resonator arm (22 to 20 in fig. 2); a gain cavity having a gain arm (21 to 54 in fig. 2); a pulse shortening element (12) disposed in the resonator arm and excluded from the

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gain arm (see fig. 2); and an optical switch for controllably selecting between the resonator arm and the gain arm (col. 9, line 11-15).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-7, 13- 16, and 24-26, are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson et al. (US pat. 6,917,631) in view of Wundke "PbS quantum- dot-doped glasses for ultrashort-pulse generation", Appl. Phys. Lett. 76, 10-12 (2000).

With respect to claims 2-6, Richardson discloses pulse shortening element (12). However, Richardson fail to specifically disclose a passive pulse shortening element comprising a saturable absorber that is a solid state, comprises a quantum dot-doped glass material, and where the saturable absorber is a liquid saturable absorber. The passive pulse shorting element comprising a saturable absorber that is a solid state, comprises a quantum dot-doped glass material, and where the saturable absorber is a liquid saturable absorber is well taught by Wundke (page 10). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Richardson's and Wundke's invention to enable passive self-starting mode locking in

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solid state lasers and to provide simpler, less expensive solutions laser design than additive pulse or active mode locking techniques, as indicate by Wundke (page 10).

With respect to claim 7, Richardson and Wundke disclose everything as claimed above. In addition, Richardson discloses a variable switch disposed in the second beam path for outputting the high power short light pulse (col. 9, line 11-15).

With respect to claim 13, Richardson and Wundke disclose everything as claimed above. In addition, Richardson discloses a first beam path and the second beam path (fig. 2) have at least one segment (12) in common (fig. 2); and the first beam path and the second beam path have respective separate segments (fig. 2), the passive pulse shortening element (12) being disposed in the separate segment of the first beam path (fig. 2).

With respect to claims 14 and 15, Richardson and Wundke disclose everything as claimed above. In addition, Richardson discloses a variable switch disposed in the common and separated segment of the second beam path for outputting the high power shod light pulse (col. 9, line 11-15 and fig. 2).

With respect to claim 16, Richardson and Wundke disclose everything as claimed above. In addition, Richardson discloses a gain module (12) disposed in the common segment (see fig. 1) a pulse selector (see Richardson, col. 2, line 51), which

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for example, indicated by Madey in pat. # 5,010, 555, is consist of a cavity dumper, disposed in the common segment and having an output beam path (see Richardson, fig. 2); a loss module disposed in the separate segment of the first beam path (col. 13, lines 21-23); and an active mode locker disposed in the separate segment of the first beam path (col. 9, lines 66-67; and a pulse shortening element (12) disposed in the separate segment of the first beam path. Richardson fail to specifically discloses a passive pulse shorting element comprises a saturable absorber. A passive pulse shortening element comprises a saturable absorber is well taught by Wundke (page 10). It

would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Richardson's and Wundke's invention to enable passive self-starting mode locking in solid state lasers and to provide simpler, less expensive solutions laser design than additive pulse or active mode locking techniques, as indicate by Wundke (page 10).

With respect to claims 24 and 25, Richardson discloses a pulsed laser comprising: a first beam path for establishing at least one shod light pulse (22 to 20 in fig. 2); a second beam path for amplifying the short light pulse to obtain at least one high power short light pulse (21 to 54 in fig. 2); and a pulse shortening element (12) disposed in the first beam path and absent from the second beam path (see fig. 2). However, Richardson fails to specifically disclose that the pulses shortening element is a passive mode locker. The pulses shortening element being a passive mode locker is well taught by Wundke (see page 10). It would have been obvious to one of ordinary

skill in the art at the time the invention was made to combine Richardson's and Wundke's invention to enable passive self-starting mode locking in solid state lasers and to provide simpler, less expensive solutions laser design than additive pulse or active mode locking techniques, as indicate by Wundke (page 10).

With respect to claim 26, Richardson discloses establishing light in a resonator cavity of the laser to produce a first light pulse (mirror 22 to 20), and a pulse shortening element (12) disposed in the resonator cavity; and the first light pulse having a duration and further having a peak power (see col. 1, line 44, amplifying light in the resonator cavity to produce a second light pulse having a peak power (col. 2, line 50) and a duration less than the duration of the first light pulse (see col. 1, lines 43-44); directing the second light pulse from the resonator cavity into a gain cavity (see fig. 2); the gain cavity excluding the saturable absorber [the short pulse element (12)] (see fig. 2); amplifying the second light pulse in the gain cavity to obtain a third light pulse having a peak power above the peak power of the second light pulse (col. 11, line 21-24 and fig. 7); and outputting the third light pulse (44) from the laser (col. 11, line 27). However, Richardson fails to specifically disclose that the pulses shortening element is a saturable absorber having a saturation level . The pulses shortening element being a saturable absorber having a saturation level is well taught by Wundke (see pages 10 and 12). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Richardson's and Wundke's invention to enable passive self-starting mode locking in solid state lasers and to provide simpler, less

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expensive solutions laser design than additive pulse or active mode locking techniques, as indicate by Wundke (page 10).

Claims 8-12 and 22-23, are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson et al. (US pat. 6,917,631) in view of Wundke "PbS quantum- dot-doped glasses for ultrashort-pulse generation", and further in view of Milam et al. (3,879,686).

With respect to claims 8-10, and 12, Richardson and Wundke disclose: a first highly reflective mirror (22); a second highly reflective mirror (20), the first beam path being defined between the first mirror and the second mirror (fig. 2) wherein the first beam path and the second beam path have a gain module (12) disposed segment in common defined between the first mirror and the switch (fig. 2); and wherein the first beam path and the second beam path have respective separate segments (fig. 2), the passive pulse shortening element (12) being disposed in the separate segment of the first beam path (fig. 2); A variable switch disposed in the common segment and in the separate segment of the second beam path for outputting the high power shod light pulse (col. 9, line 11-15). Richardson and Wundke fail to specifically disclose a third highly reflective mirror, the second beam path being defined between the first highly reflective mirror and the third highly reflective mirror. A third highly reflective mirror, the second beam path being defined between the first highly reflective mirror and the third highly reflective mirror is well taught by Milam (fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three



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references above to produce variable duration short laser pulses, as indicated by Milam (col. 2, line 46).

With respect to claim 11, Richardson and Wundke disclose everything as claimed above. In addition, Richardson discloses a loss module disposed in the separate segment of the first beam path (col. 13, lines 21-23); and an active pulse shortening element disposed in the separate segment of the first beam path (col. 9, lines 66-67).

With respect to claim 22, Richardson discloses a first high reflectivity mirror (22); a second high reflectivity mirror (20), a first beam path being defined between the first high reflectivity mirror and the second high reflectivity mirror (see fig. 2); a loss module disposed in the first beam path (col. 13, lines 21-23); an active mode locker disposed in the first beam path (col. 9, lines 66-67); a second beam path being defined between the first high reflectivity mirror and another and having a common beam path segment in common with the first beam path; a cavity dumper disposed in the common beam path segment and having an output beam path (see fig. 2); a gain module (12) disposed in the common beam path segment; and a switch disposed in the common beam path segment at a first end thereof (col. 9, line 11-15), a second end of the common beam path segment being at the first mirror (22) (see fig. 2). Richardson also discloses a pulses shortening element disposed in the first beam path (12). However, Richardson fails to specifically disclose that the pulses shortening element is a passive mode locker.

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Richardson also fails to specifically disclose a third high reflectivity mirror. The pulses shortening element being a passive mode locker is well taught by Wundke (see page 10). A third high reflectivity mirror is also well taught by Milam (see fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the three references above to produce variable duration short laser pulses, as indicated by Milam (col. 2, line 46).

With respect to claim 23, Richardson, Wundke, and Milam disclose everything as claimed above. In addition, Richardson discloses a subsequent polarizer (36) disposed in the second beam path (see fig. 2). A waveplate and a polarizer can be use interchangeable; for example, see Harney et al (US pat. 4,059,759).

Claims 18-21, are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson et al. (US pat. 6,917,631) in view of Milam (US pat. 3,879,686).

With respect to claim 18, Richardson discloses: a first mirror (22); a second mirror (20), the resonator cavity being disposed between the first mirror and the second mirror (see fig. 2), and resonator arm being disposed between the optical switch and the second mirror (20) (see fig. 2); the gain cavity being disposed between the first mirror and another item; the gain arm being disposed between the optical switch and another item (see fig. 2); wherein the resonator cavity and the gain cavity share a common segment (12) disposed between the first mirror and the optical switch. Richardson fails

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to specifically disclose a third mirror. A third mirror is well taught by Milam (fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Richardson's and Milam's inventions to produce variable duration short laser pulses, as indicated by Milam (col. 2, line 46).

With respect to claims 19 and 20, Richardson and Milam disclose everything as claimed above. In addition, Richardson discloses a variable switch disposed in the common segment and gain arm for outputting a light pulse (col. 9, line 11-15).

With respect to claim 21, Richardson and Milam disclose everything as claimed above. In addition, Richardson discloses wherein one mirror that is partly transmissive for outputting a light pulse (col. 15, line 67 and col. 16, lines 1-2).

### **Conclusion**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Guch, Jr. et al. (US pat. 6,580,732) discloses a short pulse laser resonator having a solid state gain medium with multiple laser outputs. Guch fails to disclose a quantum dot-doped saturable absorber.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ernest Unelus whose telephone number is 571-272-8596. The examiner can normally be reached on 9am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Minsun Harvey  
Supervisor  
Art Unit 2828

E.U  
